

WHAT IS CLAIMED IS:

1                   1.     A gas-liquid inertial separator, comprising  
2                   a)    an elbow having an internal wall;  
3                   b)    a fishbone separation enhancer, comprising  
4                   b)i)   a plurality of longitudinally extending vanes  
5                    positioned across the direction of gas flow and spaced  
6                    apart along the direction of gas flow; and  
7                   b)ii)   optionally, a central spine to which said vanes are  
8                    attached,

9                   wherein the vanes are oriented downwards in their longitudinal direction with  
10                  respect to gravity such that liquid collected from liquid-containing gas flowing  
11                  through said elbow runs downwards to at least one collection site.

1                   2.     The separator of claim 1, wherein said vanes are of hollow  
2                  construction and have at least one opening along a length thereof.

1                   3.     The separator of claim 2, wherein said opening is along the  
2                  entire length of the vane, said vane positioned such that the opening faces the  
3                  direction of flow of gas flowing through said elbow.

1                   4.     The separator of claim 1, wherein said vanes are mounted on  
2                  struts which extend from said spine, or from said elbow.

1                   5.     The separator of claim 1, wherein said vanes have a cross-  
2                  section having a height greater than a thickness, said vanes mounted such that an  
3                  axis through the height of the cross-section is angled from the direction of gas flow  
4                  by from 20° to about 90°.

1                   6.     The separator of claim 5, wherein said vanes are hollow and  
2                  have an opening along a length thereof, said opening facing the direction of gas  
3                  flow, the opening located such that the hollow vane has a fluid collecting lip located  
4                  at the bottom thereof.

1                   7.     The separator of claim 1, wherein a spine is present, and said  
2     vanes slope downward from said spine and terminate proximate an internal wall of  
3     said elbow.

1                   8.     The separator of claim 1, wherein a spine is present, said  
2     vanes slope downward towards said spine, said spine is hollow to provide a  
3     downward fluid flow path, and holes in said spine communicate with said vanes to  
4     provide a path for fluid collected by said vanes to enter said spine.

1                   9.     The separator of claim 1, wherein said vanes are hollow, have  
2     an opening along the length thereof, and are slidably attachable over said strut.

1                   10.    The separator of claim 1 wherein said spine is a metal spine  
2     having a width of about one half or less of the internal diameter of said elbow.

1                   11.    The separator of claim 11, wherein said spine is oriented  
2     vertically in said elbow when the inlet to the elbow is in a horizontal plane.

1                   12.    The separator of claim 1, wherein said elbow has a circular  
2     cross section.

1                   13.    The elbow of claim 1, wherein said elbow has a polygonal  
2     cross section.

1                   14.    The elbow of claim 1, wherein no spine is present, and  
2     wherein said vanes are each fixed to at least one interior wall of said elbow.

1                   15.    The separator of claim 1, said separator having a spine, said  
2     spine floatingly positioned within said elbow.

1                   16.    The separator of claim 1, wherein a bottom end of said spine  
2     is located within said elbow by a first retainer fixed to a wall of said elbow, and

3       wherein a top portion of said spine is located within said elbow by a link moveably  
4       connected to an upper retainer fixed to a wall of said elbow and moveably connected  
5       to said top portion of said spine.

1               17.       The separator of claim 16, wherein said link is a unitary link  
2       rotatably connected to said upper retainer and rotatably connected to said top portion  
3       of said spine.

1               18.       A process for the separation of droplets of liquid from a  
2       flowing gas stream, comprising directing said gas stream into a separator of claim  
3       1, collecting liquid by contact of said droplets with said fishbone separation  
4       enhancer and walls of said elbow, and providing an exit gas stream which is  
5       depleted of liquid droplets.

1               19.       The process of claim 16, wherein an inlet end of said elbow  
2       is in fluid communication with a process vessel which emanates a stream of liquid  
3       droplet-containing gas into said elbow, and collected liquid is directed back into said  
4       vessel from said separator.

1               20.       The process of claim 16, wherein said vessel is a  
2       polymerization reactor, and said liquid droplets comprise at least one of liquid  
3       monomers or oligomers.